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North Dakota Timber Industry – An Assessment of Timber Product Output and Use, 1998

David E. Haugen and Robert A. Harsel

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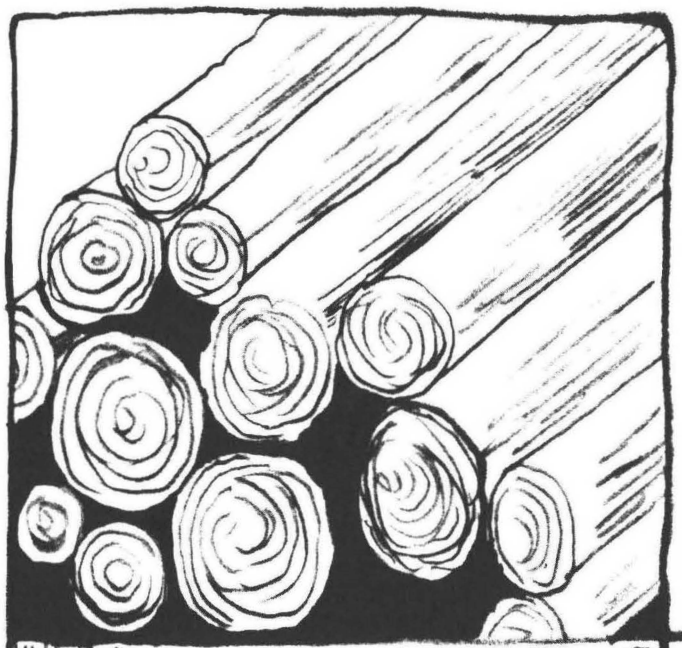

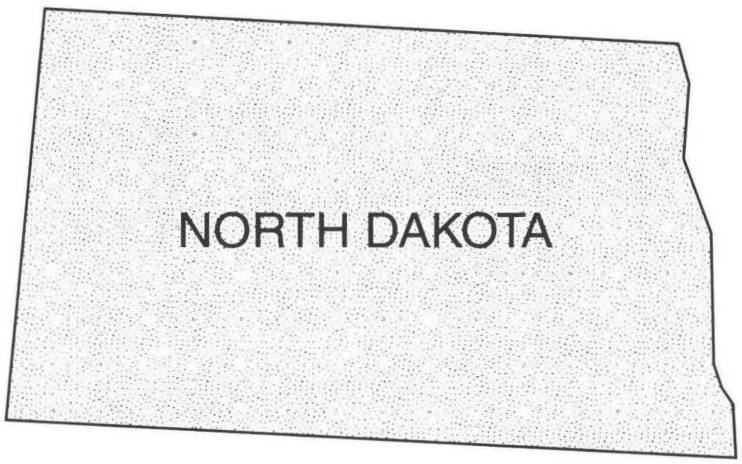

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FOREWORD

This bulletin reports findings of a survey of all known primary wood-using mills in North Dakota in 1998. Details of the industry's size, composition, use of roundwood, and generation and disposition of residues are discussed. Such detailed information is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, forest industry development, and forest research.

Special thanks are given to the primary wood-using firms that supplied information for this study, and to the North Dakota Forest Service for canvassing these wood-using firms. Their cooperation is greatly appreciated.

In this bulletin, all volumes are reported in product-specific standard units and/or cubic feet. When necessary, volumes reported by mills in nonstandard units were converted to standard units using regional conversion factors. Reported trends and changes in the North Dakota primary wood-using industry are based on comparisons with the previous surveys conducted in 1993, 1977, and 1954. Row and column data of tables may not sum due to rounding, but data in each table cell are accurately displayed.

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North Dakota Timber Industry—An Assessment of Timber Product Output and Use, 1998

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HIGHLIGHTS

Primary Wood-Using Industry

- North Dakota's primary wood-using industry totaled nine mills in 1998, a decrease of three mills since 1993. Most of the active mills are small sawmill operations, which produce less than 50 thousand board feet of product per year (table 1).
- Five of the nine mills are located in the Red River watershed region of North Dakota; the rest are located in either the Missouri River or Souris River watershed regions (fig. 1).
- In 1998, North Dakota's nine wood-using mills processed 59 thousand cubic feet of roundwood into lumber, pallets, and cabin logs.
- All of the roundwood processed by these mills in 1998 was cut from North Dakota's forest lands.

Industrial Roundwood Production

- In 1998, a total of 418 thousand cubic feet of industrial roundwood was harvested from North Dakota's forest lands, a decrease of nearly 10 percent since 1993 but still 3.1 times higher than the level in 1977 (table 2, fig. 2).
- Most of this volume, 359 thousand cubic feet, was processed into reconstituted wood-panel products such as oriented strand board in the State of Minnesota (table 2).
- Pulpwood surpassed saw logs as the main form of industrial roundwood harvested from North Dakota's forest lands in 1998. The only other industrial roundwood product cut from North Dakota's forest lands in 1998 was a small volume of ponderosa pine cabin logs (table 3).
- Because of the increase in pulpwood harvests, aspen is now the predominate species cut from North Dakota's forest lands.
- Due in large part to mill closures, saw-log production has fallen to the lowest level in any recorded survey, dropping by 83 percent since 1993 to only 313 thousand board feet (table 4, fig. 3).
- Cottonwood accounts for more than 80 percent of the saw logs produced from North Dakota's forest lands. Three other hardwood species account for most of the remainder: basswood 9 percent, bur oak 4 percent, and green ash 3 percent.
- Most of the State's saw-log production comes out of the Red River watershed region, the same region that contains most of the State's saw mills.
- Four counties—Cass, Grand Forks, Pembina, and Traill—account for 88 percent of the saw logs produced in the State.

Timber Removals for Industrial Roundwood

- In the process of harvesting industrial roundwood, an estimated 491 thousand cubic feet of woody material was removed from the State's forest lands in 1998 (table 5, fig. 4).

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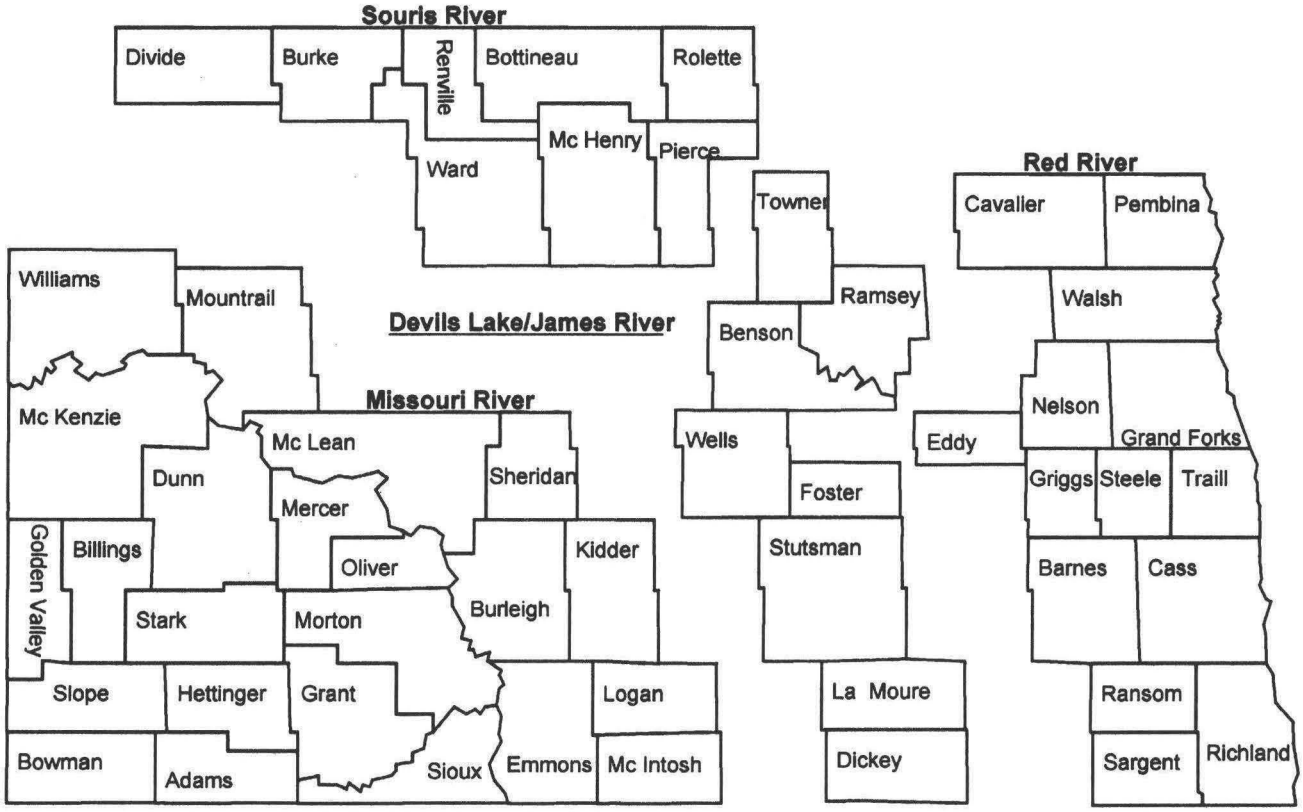

Figure 1.—*Major watershed regions in North Dakota.*

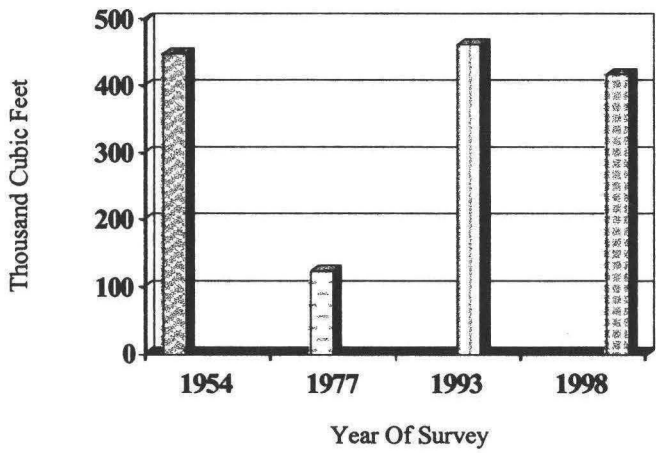

Figure 2.—*Industrial roundwood production, North Dakota 1954-1998.*

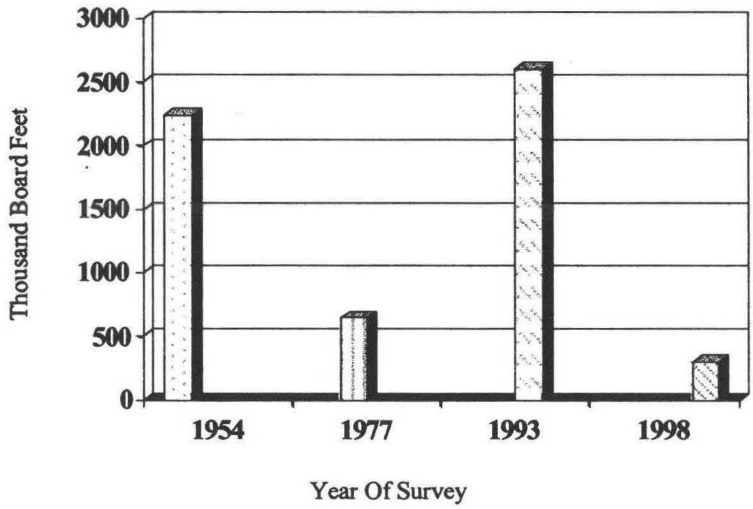

Figure 3.—*Saw-log production, North Dakota 1954-1998.*

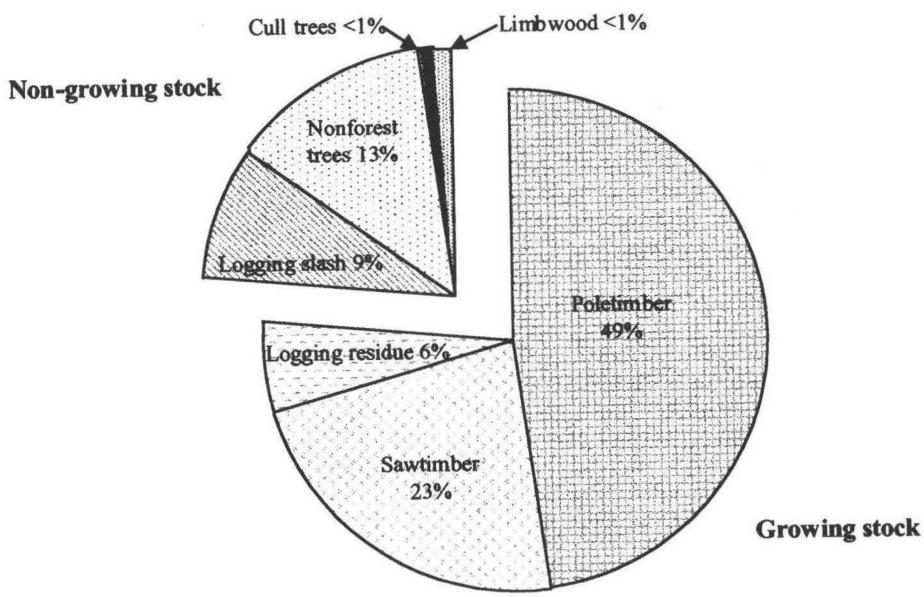

Figure 4.—*Distribution of timber removals for industrial roundwood by source of material, North Dakota, 1998.*

- In 1998, industrial products accounted for 85 percent of the woody material removed, up from 66 percent in 1993. Two factors contributed to this change—the closing of several sawmills in the State and the increasing harvest of aspen pulpwood for the manufacturing of reconstituted wood-panel products such as oriented strand board.

- These two factors are also responsible for the increased reliance on pole-size trees, and the shift away from sawtimber-size trees since 1993. Before the blossoming of the State's aspen pulpwood market, most of the industrial roundwood was supplied by sawtimber-sized trees. In comparison, sawtimber-size trees supply only about a quarter of today's industrial roundwood products.

- Of the 15 percent of woody material left on the ground in 1998, about 60 percent was in tops and cull material (logging slash), and the rest (logging residue) came from growing-stock portions of live trees.

- Aspen accounted for more than 57 percent of all harvest residue generated by industrial roundwood harvesting in the State (table 6).

- In total, 78 percent of the woody material was harvested from growing-stock sources (sawtimber, poletimber, and logging residues) in 1998. The remaining material came from non-growing-stock sources including nonforest trees, limbwood, cull trees, and logging slash.

- Together, industrial roundwood extraction and the resulting generation of logging residues removed 383 thousand cubic feet of growing-stock volume from the State's timberland inventory in 1998 (table 7). In board foot equivalents, 705 thousand board feet of this total was removed from the sawtimber portion of the growing-stock inventory (table 8).

Primary Mill Residues

- In the process of converting industrial roundwood into products such as lumber, pallets, and cabin logs, the State's primary wood-using industry produced an estimated 870 green tons of mill residues (table 9).

- About half of this volume was in the form of coarse wood residue, such as slabs and edgings, which is suitable for chipping (fig. 5). However, at this time no outlet exists for this potential supply of pulp chips, so most of it ends up being used as domestic fuelwood.

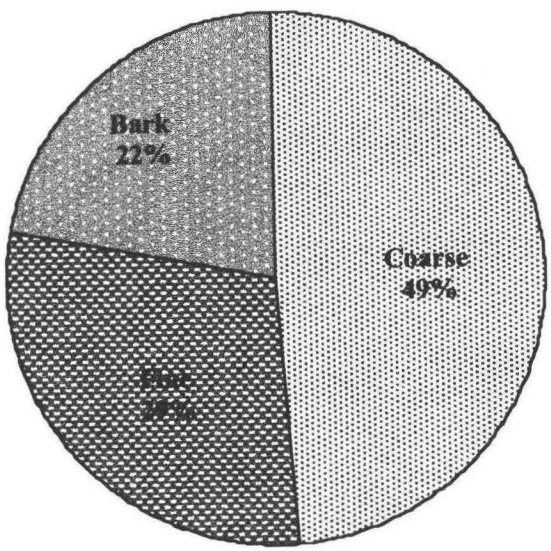

Figure 5.—*Distribution of residues generated by wood-using mills by type of residue, North Dakota, 1998.*

- Fine wood residues such as sawdust and shavings make up about 30 percent of the mill residues generated, 84 percent of which is used for miscellaneous products.

- Bark makes up the remainder of the mill residues, and most of it still goes unused.

- Overall, domestic fuelwood is the main byproduct derived from North Dakota's mill residues (fig. 6). However, a full 40 percent of the residues still go unused, a major increase since 1993 when only 12 percent of residue went unused. This decrease reflects the declining size and number of mills in the State.

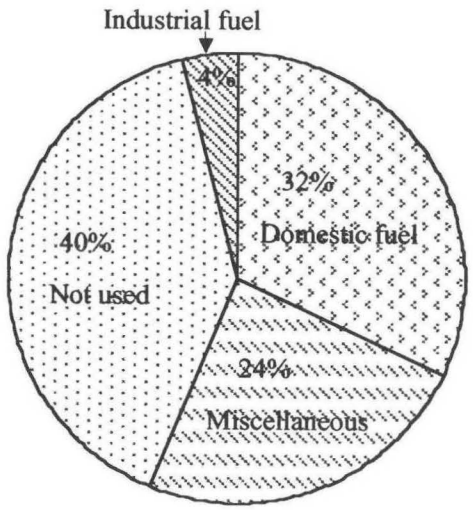

Figure 6.—*Distribution of residues generated by primary wood-using mills by type of residue, North Dakota, 1998.*

APPENDIX

Study Methods

This study was a cooperative effort of the North Dakota Forest Service (NDFS) and the North Central Research Station (NCRS). Using mail questionnaires supplied by NCRS and designed to determine the size and composition of the State's primary wood-using industry, its use of roundwood, and its generation and disposition of wood residues, the NDFS canvassed all known primary wood-using mills within the State. The NDFS followed up on nonresponding mills using additional mailings, telephone, and personal contacts until a 100-percent response of known mills was achieved. Completed questionnaires were sent to NCRS for editing and processing.

As part of data editing and processing, all industrial roundwood volumes reported on the questionnaires were converted to standard units of measure using regional conversion factors. Timber removals by source of material and harvest residues generated during logging were estimated from standard product volumes using factors developed from logging utilization studies previously conducted by NCRS. Finalized data on North Dakota's industrial roundwood receipts were loaded into a regional timber removals database and supplemented with data on out-of-State uses of North Dakota's roundwood to provide a complete assessment of North Dakota's timber product output.

Definition of Terms

Board foot.—Unit of measure applied to roundwood. It relates to lumber that is 1 foot long, 1 foot wide, and 1 inch thick (or its volume equivalent).

Central stem.—The portion of a tree between a 1-foot stump and the minimum 4.0-inch top diameter outside bark or the point where the central stem breaks into limbs.

Coarse mill residue.—Wood residue suitable for chipping such as slabs, edgings, and veneer cores.

Commercial species.—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam, peachleaf willow, wild plum.)

Cull removals.—Net volume of rough and rotten trees, plus the net volume in sections of the central stem of growing-stock trees that do not meet regional merchantability standards, harvested for industrial roundwood products.

Dead removals.—Net volume of dead trees harvested for industrial roundwood products.

Diameter at breast height (d.b.h.).—The outside bark diameter at 4.5 feet above the forest floor on the uphill side of the tree. For determining breast height, the forest floor includes the duff layer that may be present, but does not include unincorporated woody debris that may rise above the ground line.

Fine mill residue.—Wood residue not suitable for chipping such as sawdust and veneer clippings.

Forest land.—Land at least 10 percent stocked (Note: Historically, 16.7 percent was used based on full stocking equaling 167 percent) by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparing specified standards with basal area and/or number of trees, age or size, and spacing.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails or clearings in forest areas shall be classed as forest if less than 120 feet wide. Streams and other bodies of water shall be classed as forest if less than 30 feet wide.

Growing-stock removals.—The growing-stock volume removed from the timberland inventory by harvesting industrial roundwood products. (Note: Includes sawtimber removals, poletimber removals, and logging residues.)

Growing-stock tree.—A live timberland tree of commercial species that contains at least one 12-foot saw log or two saw logs 8 feet meeting minimum log/tree grade requirements, now or prospectively, and that meets specified standards of size, quality, and merchantability. At least one-third of the gross board-foot volume must be merchantable material and at least 50 percent sound at any point. (Note: Excludes rough, rotten, and dead trees.)

Growing-stock volume.—Net volume of growing-stock trees 5.0 inches d.b.h. and over, from 1 foot above the ground to a minimum 4.0-inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous.

Harvest residues.—The total net volume of unused portions of trees cut or killed by logging. (Note: Includes both logging residues and logging slash.)

Industrial roundwood production.—The quantity of industrial roundwood harvested in a geographic area.

Industrial roundwood products.—Saw logs, pulpwood, veneer logs, poles, commercial posts, piling, cooperage logs, particleboard bolts, shaving bolts, lath bolts, charcoal bolts, and chips from roundwood used for fuel, pulp, or board products.

Industrial roundwood receipts.—The quantity of industrial roundwood received by commercial mills in a geographic area.

International 1/4-inch rule.—A log rule or formula for estimating the board-foot volume of logs, allowing 1/2 inch of taper for each 4-foot length. The rule appears in a number of forms that allow for kerf. In this form, 1/4 inch of kerf is assumed. This rule is used as the USDA Forest Service standard log rule in the Eastern United States.

Limbwood removals.—Net volume of all portions of a tree other than the central stem, (including forks, large limbs, tops, and stumps) harvested for industrial roundwood products.

Logging residue.—Net volume of unused portions of the merchantable central stem of growing-stock trees cut or killed by logging.

Logging slash.—Net volume of unused portions of the unmerchantable (non-growing-stock) sections of trees cut or killed by logging.

Merchantable sections.—Sections of the central stem of growing-stock trees that meet either pulpwood or saw-log specifications.

Net volume.—Gross volume less deductions for rot, sweep, or other defects affecting use for roundwood products.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial roundwood products. Classified in volume tables as rough trees.

Nonforest land.—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 39.9-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, improved roads and nonforest strips must be more than 120 feet wide and more than 1 acre to qualify as nonforest land.)

Nonforest land removals.—Net volume of trees on nonforest lands harvested for industrial roundwood products.

Poletimber.—A growing-stock tree at least 5.0 inches d.b.h. but smaller than sawtimber size (9.0 inches d.b.h. for softwoods, 11.0 inches d.b.h. for hardwoods).

Poletimber removals.—Net volume in the merchantable central stem of poletimber trees harvested for industrial roundwood products.

Primary wood-using mills.—Mills receiving roundwood or chips from roundwood for processing into products.

Primary wood-using mill residue.—Wood materials (coarse and fine) and bark generated at manufacturing plants from roundwood processed into principal products. These residues include wood products (byproducts) obtained incidental to production of principal products and wood materials not utilized for some byproduct.

Rotten tree.—A tree that does not meet regional merchantability standards because of excessive unsound cull.

Rough tree.—A tree that does not meet regional merchantability standards because of excessive sound cull. Includes noncommercial tree species.

Roundwood.—Logs, bolts, or other round sections cut from trees (including chips from roundwood).

Sapling.—A live tree between 1.0 and 5.0 inches d.b.h.

Sapling removals.—Net volume in saplings harvested for industrial roundwood products.

Saw log.—A log meeting minimum standards of diameter, length and defect, sound and straight, and with a minimum diameter outside bark of 7 inches for softwoods and 9 inches for hardwoods, or other combinations of size and defect specified by regional standards.

Saw-log portion.—That portion of the central stem of sawtimber trees between the stump and the saw-log top.

Saw-log top.—The point on the central stem of sawtimber trees above which a saw log cannot be produced. The minimum saw-log top is 7.0 inches diameter outside bark (d.o.b.) for softwoods and 9.0 inches d.o.b. for hardwoods.

Sawtimber removals.—As used in table 5, sawtimber removals refers to the net volume in the merchantable central stem of sawtimber trees harvested for industrial roundwood products. (Note: Includes the saw-log and upper-stem portions of sawtimber trees.) In the case of sawtimber

volume removed from timberland inventory as in table 8, sawtimber removals refers to the net volume in the saw-log portion of sawtimber trees harvested for roundwood products or left on the ground as logging residue, and is usually expressed in thousands of board feet (International 1/4-inch rule).

Sawtimber tree.—A growing-stock tree containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting regional specifications for freedom from defect. Softwoods must be at least 9.0 inches d.b.h. and hardwoods must be at least 11.0 inches d.b.h.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Timberland.—Forest land that is producing, or is capable of producing, in excess of 20 cubic feet per acre per year of industrial roundwood products under natural conditions, is not withdrawn from timber utilization by statute or administrative regulation, and is not associated with urban or rural development.

Timber product output.—The volume of roundwood products produced from an area's forests.

Timber removals.—The total net volume of trees removed for industrial roundwood products or left on the ground as harvest residues.

Tree.—A woody plant usually having one or more perennial stems, a more or less definitely formed crown of foliage, and a height of at least 12 feet at maturity.

Upper-stem portion.—That portion of the central stem of sawtimber trees between the saw-log top and the minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs.

Common and Scientific Names of Tree Species Mentioned in this Report

Softwoods

Ponderosa pine ..... *Pinus ponderosa*
White spruce ..... *Picea glauca*

Hardwoods

White oak
  Bur oak ..... *Quercus macrocarpa*
Ash
  Black ash (rarely found) ..... *Fraxinus nigra*
  Green ash ..... *Fraxinus pennsylvanica*
Aspen
  Quaking aspen ..... *Populus tremuloides*
Balsam poplar ..... *Populus balsamifera*
Cottonwood
  Eastern cottonwood ..... *Populus deltoides*
  Plains cottonwood ..... *Populus sargentii*
American basswood ..... *Tilia americana*
Elm
  American elm ..... *Ulmus americana*
  Slippery elm (rarely found) ..... *Ulmus rubra*
White birch ..... *Betula papyrifera*

Table Titles

Table 1.—Number of active primary wood-using mills, North Dakota, 1998

Table 2.—Industrial roundwood production by species group and State of destination, North Dakota, 1998

Table 3.—Industrial roundwood production by species group and type of product, North Dakota, 1998

Table 4.—Saw-log production by county and species group, North Dakota, 1998

Table 5.—Timber removals for industrial roundwood by species group and source of material, North Dakota, 1998

Table 6.—Harvest residue generated by industrial roundwood harvesting by county and species group, North Dakota, 1998

Table 7.—Growing-stock removals from timberland for industrial roundwood by county and species group, North Dakota, 1998

Table 8.—Sawtimber removals from timberland for industrial roundwood by county and species group, North Dakota, 1998

Table 9.—Residues produced at primary wood-using mills by type of use and type of material, North Dakota, 1998

Table 1.--Number of active primary wood-using mills, North Dakota, 1998

Kind of mill	Number of mills
Sawmills	
<50 MBF[1]	6
50 to 1,000 MBF[1]	2
Total	8
Other mills	1
Total	9

[1] Thousand board feet per year, International 1/4-inch rule.

Table 2.--Industrial roundwood production by species group and State of destination, North Dakota, 1998

(In thousand cubic feet)

Species	Total	Minnesota	North Dakota
Softwoods			
Spruce	*	--	*
Ponderosa pine	6	--	6
Total	6		6
Hardwoods			
White birch	*	*	--
Ash	2	--	2
Cottonwood	44	--	44
Balsam poplar	3	3	--
Aspen	356	356	*
White oak group	2	--	2
Basswood	5	--	5
Total	412	359	54
All species	418	359	59

*Less than 500 cubic feet.
Rows and columns may not sum due to rounding.

Table 3.--Industrial roundwood production by species group and type of product, North Dakota, 1998

Species group	Saw logs		Pulpwood		Cabin logs	All products
	MBF[1]	MCF[2]	Cords[3]	MCF[2]	MCF[2]	MCF[2]
Softwoods						
Spruce	1	*	--	--	--	*
Ponderosa pine	7	1	--	--	4	6
Total	8	1	--	--	4	6
Hardwoods						
White birch	--	--	*	--		*
Ash	10	2	--	--	--	2
Cottonwood	253	44	--	--	--	44
Balsam poplar	--	--	45	3	--	3
Aspen	2	--	4,741	356	--	356
White oak group	14	2	--	--	--	2
Basswood	27	5	--	--	--	5
Total	305	54	4,786	359	--	412
All species	313	55	4,786	359	4	418

[1]Thousand board feet, International 1/4-rule.

[2] Thousand cubic feet.

[3] Standard cords are 128 cubic feet consisting of 79 cubic feet of wood and 49 cubic feet of bark and air space.

* Less than 1/2 unit of measure.

Rows and columns may not sum due to rounding.

Table 4.--Saw-log production by county and species group, North Dakota, 1998

(In thousand board feet) [1]

County group	Ponderosa pine	Spruce	Total softwoods	Ash	Cottonwood	Aspen	White oak group	Basswood	Total hardwoods	All species
Red River [2]	--	1	1	10	242	--	14	27	293	294
Devils Lake & James River [3]	--	--	--	--	--	--	--	--	--	--
Souris River [4]	7	--	7	--	--	2	--	--	2	9
Missouri River [5]	--	--	--	--	11	--	--	--	11	11
Total	7	1	8	10	253	2	14	27	305	313

[1] International 1/4-inch rule.

[2] Red River includes: Barnes, Cavalier, Cass, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh Counties.

[3] Devils Lake & James River includes: Benson, Dickey, Foster, La Moure, Stutsman, Ramsey, Towner, and Wells Counties.

[4] Souris River includes: Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward Counties.

[5] Missouri River includes: Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sioux, Sheridan, Slope, Stark, and Williams Counties.

Rows and columns may not sum due to rounding.

Table 5.--Timber removals for industrial roundwood by species group and source of material, North Dakota, 1998

(In thousand cubic feet)

Species group	Growing stock				Non-growing stock							Total material used for products	Harvest residue	Total material harvested
	Used for products				Used for products									
	Saw-timber	Pole-timber	Logging residue	Total	Limb-wood	Sap-ling	Cull trees	Dead trees	Nonforest trees	Logging slash	Total			
Softwoods														
Spruce	0.2	*	*	0.2	*	--	*	--	--	*	*	0.2	*	0.2
Ponderosa pine	5.4	0.1	0.2	5.6	0.1	--	*	--	--	1.9	2.0	5.6	2.1	7.6
Total	5.6	0.1	0.2	5.8	0.1	--	*	--	--	2.0	2.0	5.7	2.1	7.9
Hardwoods														
White birch	*	*	*	*	--	--	--	--	*	*	*	*	*	*
Ash	1.6	*	0.2	1.8	*	--	*	--	--	0.4	0.4	1.6	0.6	2.3
Cottonwood	39.8	2.6	8.5	50.9	1.2	--	0.9	--	--	15.9	17.9	44.5	24.4	68.9
Balsam poplar	0.5	2.2	0.2	3.0	--	--	--	--	0.6	0.2	0.8	3.4	0.4	3.8
Aspen	57.2	237.1	19.0	313.3	*	--	*	--	61.6	22.8	84.4	355.9	41.8	397.7
White oak group	2.2	*	0.3	2.6	*	--	0.1	--	--	0.6	0.6	2.3	0.9	3.2
Basswood	4.2	0.3	0.9	5.4	0.1	--	0.1	--	--	1.7	1.9	4.7	2.6	7.3
Total	105.6	242.2	29.1	376.9	1.3	--	1.1	--	62.2	41.5	106.2	412.5	70.7	483.1
All species	111.2	242.3	29.3	382.8	1.4	--	1.1	--	62.2	43.5	108.2	418.2	72.8	491.0

* Less than 50 cubic feet.

Rows and columns may not sum due to rounding.

Table 6.-- Harvest residue generated by industrial roundwood harvesting by county and species group, North Dakota, 1998

(In thousand cubic feet)

County group	Ponderosa pine	Spruce	Total softwoods	White birch	Ash	Cottonwood	Balsam poplar	Aspen	White oak group	Basswood	Total hardwoods	All species
Red River [1]	--	*	*	*	1	23	*	42	1	2	70	70
Devils Lake & James River [2]	--	--	--	--	--	--	--	--	--	--	--	--
Souris River [3]	*	--	*	--	--	--	--	*	--	--	*	*
Missouri River [4]	2	--	2	--	--	1	--	--	--	--	1	3
Total	2	*	2	*	1	24	*	42	1	2	71	73

[1] Red River includes: Barnes, Cavalier, Cass, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh Counties.

[2] Devils Lake & James River includes: Benson, Dickey, Foster, La Moure, Stutsman, Ramsey, Towner, and Wells Counties.

[3] Souris River includes: Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward Counties.

[4] Missouri River includes: Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sioux, Sheridan, Slope, Stark, and Williams Counties.

* Less than 500 cubic feet.

Rows and columns may not sum due to rounding.

Table 7.--Growing-stock removals from timberland for industrial roundwood by county and species group, North Dakota, 1998

(In thousand cubic feet)

County group	Ponderosa pine	Spruce	Total softwoods	White birch	Ash	Cottonwood	Balsam poplar	Aspen	White oak group	Basswood	Total hardwoods	All species
Red River [1]	--	*	*	*	2	48	3	313	3	5	374	374
Devils Lake & James River [2]	--	--	--	--	--	--	--	--	--	--	--	--
Souris River [3]	1	--	1	--	--	--	--	*	--	--	*	1
Missouri River [4]	4	--	4	--	--	2	--	--	--	--	2	6
Total	5	*	6	*	2	51	3	313	3	5	377	383

[1] Red River includes: Barnes, Cavalier, Cass, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh Counties.

[2] Devils Lake & James River includes: Benson, Dickey, Foster, La Moure, Stutsman, Ramsey, Towner, and Wells Counties.

[3] Souris River includes: Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward Counties.

[4] Missouri River includes: Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sioux, Sheridan, Slope, Stark, and Williams Counties.

* Less than 500 cubic feet.

Rows and columns may not sum due to rounding.

Table 8.--Sawtimber removals from timberland for industrial roundwood by county and species group, North Dakota, 1998

(In thousand board feet) [1]

County group	Ponderosa pine	Spruce	Total Softwoods	White birch	Ash	Cottonwood	Balsam poplar	Aspen	White oak group	Basswood	Total Hardwoods	All Species
Red River [2]	--	1	1	*	9	242	3	365	13	27	660	661
Devils Lake & James River [3]	--	--	--	--	--	--	--	--	--	--	--	--
Souris River [4]	7	--	7	--	--	--	--	1	--	--	1	8
Missouri River [5]	25	--	25	--	--	11	--	--	--	--	11	36
Total	32	1	33	*	9	253	3	366	13	27	672	705

[1] International 1/4-inch rule.

[2] Red River includes: Barnes, Cavalier, Cass, Eddy, Grand Forks, Griggs, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Traill, and Walsh Counties.

[3] Devils Lake & James River includes: Benson, Dickey, Foster, La Moure, Stutsman, Ramsey, Towner, and Wells Counties.

[4] Souris River includes: Bottineau, Burke, Divide, McHenry, Pierce, Renville, Rolette, and Ward Counties.

[5] Missouri River includes: Adams, Billings, Bowman, Burleigh, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, McIntosh, McLean, McKenzie, Mercer, Morton, Mountrail, Oliver, Sioux, Sheridan, Slope, Stark, and Williams Counties.

* Less than 500 board feet

Rows and columns may not sum due to rounding.

Table 9.--Residues produced at primary wood-using mills by type of use and type of material, North Dakota, 1998

(In thousand tons, green weight)

	Wood residue											
	Coarse[1]			Fine[2]			Bark			All		
Type of use	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total
Industrial fuel	--	0.03	0.03	--	--	--	--	--	--	--	0.03	0.03
Domestic fuel	0.02	0.21	0.23	--	*	*	*	0.05	0.05	0.02	0.26	0.28
Miscellaneous[3]	--	--	--	*	0.21	0.21	--	--	--	*	0.21	0.21
Not used	--	0.17	0.17	0.02	0.02	0.04	0.02	0.12	0.14	0.04	0.31	0.35
Total	0.02	0.41	0.43	0.02	0.23	0.25	0.02	0.17	0.19	0.06	0.81	0.87

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.
[2] Not suitable for chipping such as sawdust, veneer clippings, etc.
[3] Livestock bedding, mulch, small dimension, and specialty items.
* Less than 5 green tons.
Rows and columns may not sum due to rounding.

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Reports findings of a survey of all primary wood-using mills in North Dakota in 1998 and compares those findings with earlier surveys. Reports production and receipts of industrial roundwood by product, species, and county. Also reports the quantity, type and disposition of wood and bark residues generated by North Dakota's primary wood-using industry.

KEY WORDS: Bark, mill, production, roundwood, residues, saw logs.

Our job at the North Central Research Station is discovering and creating new knowledge and technology in the field of natural resources and conveying this information to the people who can use it. As a new generation of forests emerges in our region, managers are confronted with two unique challenges: (1) Dealing with the great diversity in composition, quality, and ownership of the forests, and (2) Reconciling the conflicting demands of the people who use them. Helping the forest manager meet these challenges while protecting the environment is what research at North Central is all about.